



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/655,176	09/04/2003	Krzysztof Barnat	EH-10831(03-359)	6785

34704 7590 06/30/2005

BACHMAN & LAPOINTE, P.C.
900 CHAPEL STREET
SUITE 1201
NEW HAVEN, CT 06510

EXAMINER

NGUYEN, GEORGE BINH MINH

ART UNIT	PAPER NUMBER
----------	--------------

3723

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/655,176

Applicant(s)

BARNAT ET AL.

Examiner

George Nguyen

Art Unit

3723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is, closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6-10 is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☒ Claim(s) 3-5 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 090403.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Receipt is acknowledged of the IDS filed on September 04, 2003 which has been considered and placed of record in the file.

Claims 1-10 are presented for examination.

This application has been filed with formal drawings which are acceptable to the examiner.

Claim Objections

1. Claim 1 is objected to because of the following informalities: in line 7, the word "the" after "inlet" should be deleted. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

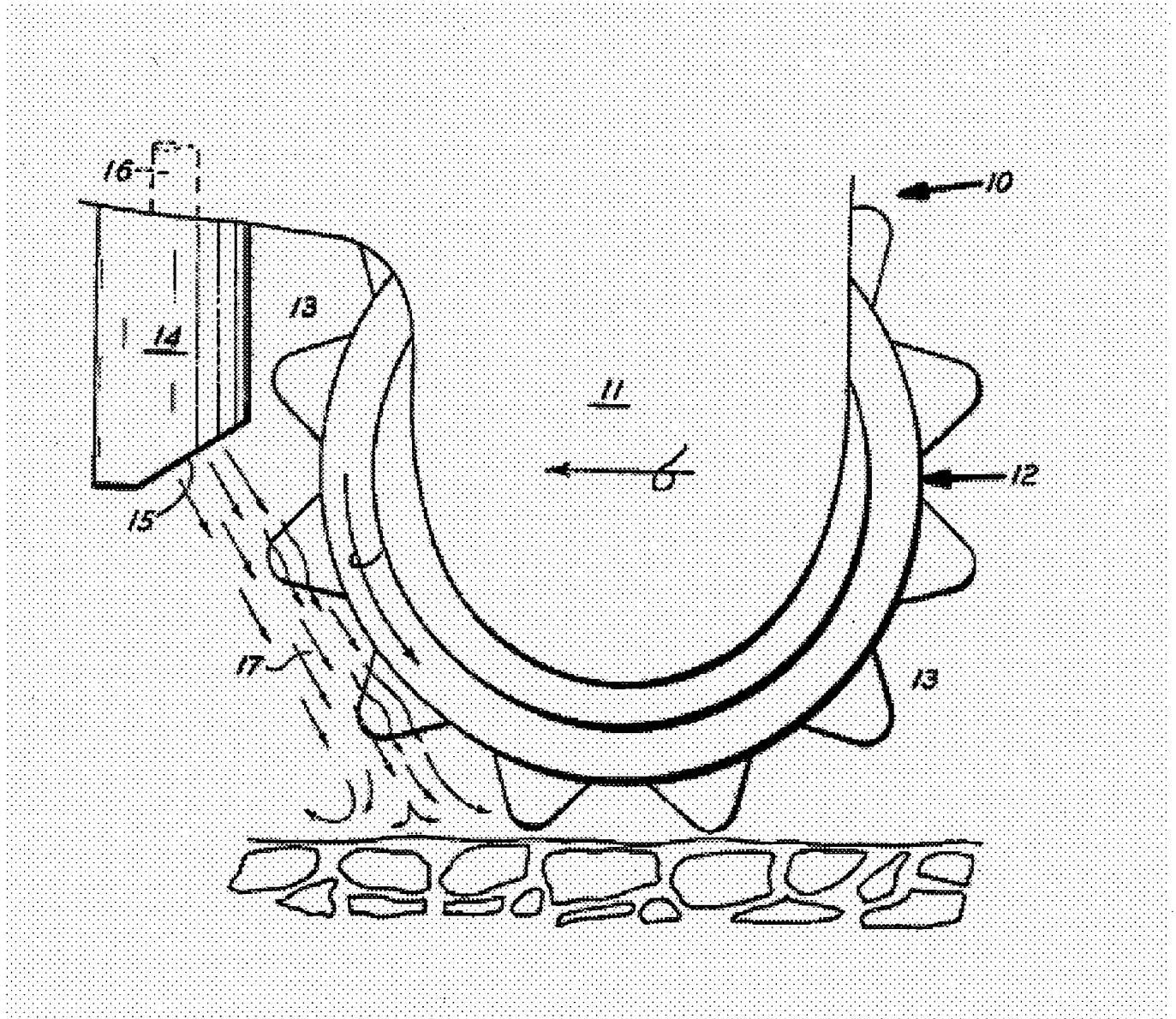
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Slaughter'4,582,149 in view Cornelius et al.'5,810,265.

With reference to Figure 1, col. 2, line 1-42, Slaughter discloses the claimed invention including: a) a convoluted rotating bit 10; b) a coolant nozzle positioned to direct a coolant stream tangentially at the bit in a direction of rotation of the bit. Please note that the limitations of "for cutting a plurality of slots in a disk" is interpreted as the intended use; thus, Slaughter's rotating bit is capable of cutting slot in a disk. Furthermore, in col.

Art Unit: 3723

2, lines 38-42, Slaughter suggested the desirability of strengthening the nozzle to prevent it from being blown out of the opening by the drilling fluid under pressure.



4,582,149

1

DRILL BIT HAVING REPLACEABLE NOZZLES DIRECTING DRILLING FLUID AT A PREDETERMINED ANGLE

CROSS-REFERENCE TO OTHER APPLICATIONS

This is a continuation-in-part of U.S. patent application Ser. No. 241,909, filed Mar. 9, 1981, for Mounting Means for Drill Bit Directed Nozzles "now abandoned".

BACKGROUND OF THE INVENTION

The present invention generally relates to rolling cutter drill bits and more specifically involves a nozzle mounting system for a jet-type rolling cutter drill bit. In conventional drilling bits, having the jet nozzle structure, the nozzles generally are formed separately and attach to the drill bodies by means such as braising, set screws, and pressing in. The present invention discloses an extended nozzle system for use in a rolling cutter drill bit which nozzle system may be a single integrally formed nozzle member or may comprise multiple segment nozzles of two or more different alloys. A means is disclosed for detachably securing the nozzle quickly and efficiently to the drill body and additional means is disclosed for alignment of the nozzle in the body in a predetermined angular position.

In the pending application to J. S. Childers, et al., CIP, Ser. No. 553,937 filed Nov. 21, 1983, entitled "Rolling Cutter Drill Bit", a drill bit having extended directed nozzles was disclosed which is particularly advantageous for use in high overbalance and plastic formations. The present invention is particularly useful in the drilling bit disclosed in said Childers, et al. application in its entirety is incorporated herein by reference.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial schematic side view of a rolling cutter drill bit having one directed nozzle system of this invention.

FIG. 2 is a bottom view of a tri-cone bit with three nozzle systems of FIG. 1.

FIG. 3 is a cross-sectional illustration of one embodiment of the nozzle system.

FIGS. 4, 5 and 6 are different views of the nozzle system of FIG. 3.

FIGS. 7 and 8 are illustrations of a second embodiment of the nozzle system of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention discloses a directed nozzle retention system for use in a tri-cone rolling cutter drill bit such as that disclosed in FIGS. 1 and 2, comprising a bit body adapted to be detachably secured to a drill string for rotating the bit and to receive drilling fluid under pressure from the drill pipe. In FIG. 1, the drill bit 10 further comprises a lug section 11 having a rolling cutter 12 mounted in cantilever fashion thereon. Cutter 12 comprises a generally frusto-conical cutter body and hard metal cutting elements 13 inserted in bores in the outer surface thereof engageable with the formation at the bottom of the well bore. The cutting elements are preferably formed of a tungsten carbide material having good erosion and abrasion resistant properties and are commonly referred to as inserts. The body of bit 10 has a set of extended fluid jetting nozzles or nozzle members

2

14 attached thereto with nozzle openings 15 formed therein in communication with a fluid passage 16 in the bit body. A stream of fluid 17 is jetted through passage 16 and nozzle 14 across inserts 13. As shown in FIG. 2, the tri-cone bit has three frusto-conical cutters 12 rotatably mounted on three legs of the bit body and three spray nozzles 14 with each nozzle 14 having its opening 15 directed towards the front of the cutter such that the stream of jetted fluid 17 impinges the inserts generally tangentially to the cutter immediately prior to the inserts contacting the borehole face.

FIG. 3 is a partial cross-sectional view of the nozzle 14 illustrated in FIGS. 1 and 2. In FIG. 3 the retention and alignment system of the present invention is more clearly disclosed. The nozzle 14 has a generally centrally located bore passing 18 of varying diameter. Bore passage 18 is wide at its upper portion (i.e., its lower portion as shown in FIG. 3 with the nozzle in inverted position) to coaxially align with fluid passage 16 in the bit body. The bore 18 narrows to a relatively narrow lower end (i.e., upper end as illustrated) exiting at nozzle opening 15. Bore passage 18 where it intersects face 19 of the nozzle is generally perpendicular to face 19. Face 19 makes an angle A with a plane perpendicular to the central longitudinal axis of nozzle 14. Likewise, the upper end of bore passage 18 makes an angle A with the central longitudinal axis C of the nozzle.

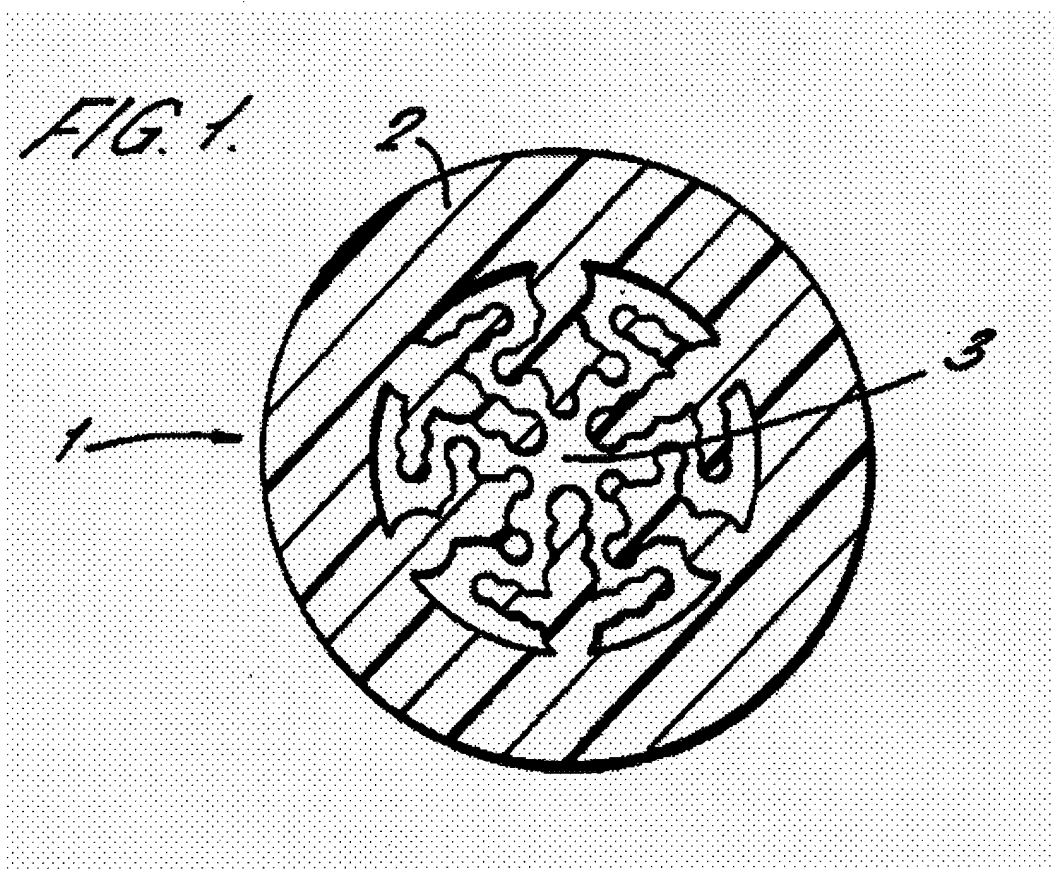
An enlarged cylindrical opening or bore 20 is formed in bit body 10 in coaxial alignment with bore passage 16 and extending up from the underside of the bit body. Cylindrical opening 20 is sized for relatively close engagement with nozzle 14 allowing a small amount of clearance therebetween. An annular retention groove 21 is formed in the wall of opening 20 to align with a similar groove 22 formed annularly into the cylindrical wall of nozzle 14. A flat circular snap ring 23 is located conjointly in grooves 21 and 22 to secure nozzle 14 in bore 20 and prevent the nozzle from being blown out of the opening by the drilling fluid under pressure.

Because of the nature of the present invention and more particularly because of the directed orientation of the nozzle bore opening 15, it is important that the nozzle 14 be aligned properly in the body to provide the critical stream of fluid in the proper orientation with respect to the cutters and inserts. Also, it is important that this critical alignment of jet opening 15 be maintained throughout the life of the drill bit. The alignment of the nozzle 14 in bore 20 is better indicated by the partial cross-sectional view of FIG. 4. In FIG. 4, a vertical alignment slot 25 has been machined in a portion of the outer wall of nozzle 14. A generally rectangularly shaped alignment key 26 has been welded in slot 25. A matching alignment groove 27 is formed in the wall of bore 20 at the proper location to provide correct nozzle alignment of opening 15 when key 26 is located therein. The joint action of alignment key 26 in slot 27 and the retention effect of snap ring 23 in grooves 21 and 22 provides retention and alignment of the nozzle in the bit body. Once the proper location of slot 25 and slot 27 have been determined for the particular size and angle bit, the manufacturing process is adapted to form the two slots in the same location for every nozzle and every bit body, thus providing consistent and proper alignment of the nozzle opening with respect to the cutters and inserts for each bit.

Art Unit: 3723

However, Slaughter does disclose a nozzle having a convoluted section as set forth in the claim.

With reference to Figure 1, col. 2, lines 46-50. Cornelius discloses a spraying nozzle having a convoluted inner surface 3. The advantage of the convoluted inner surface of the nozzle contributes to the resistance to distortion of the nozzle during use.

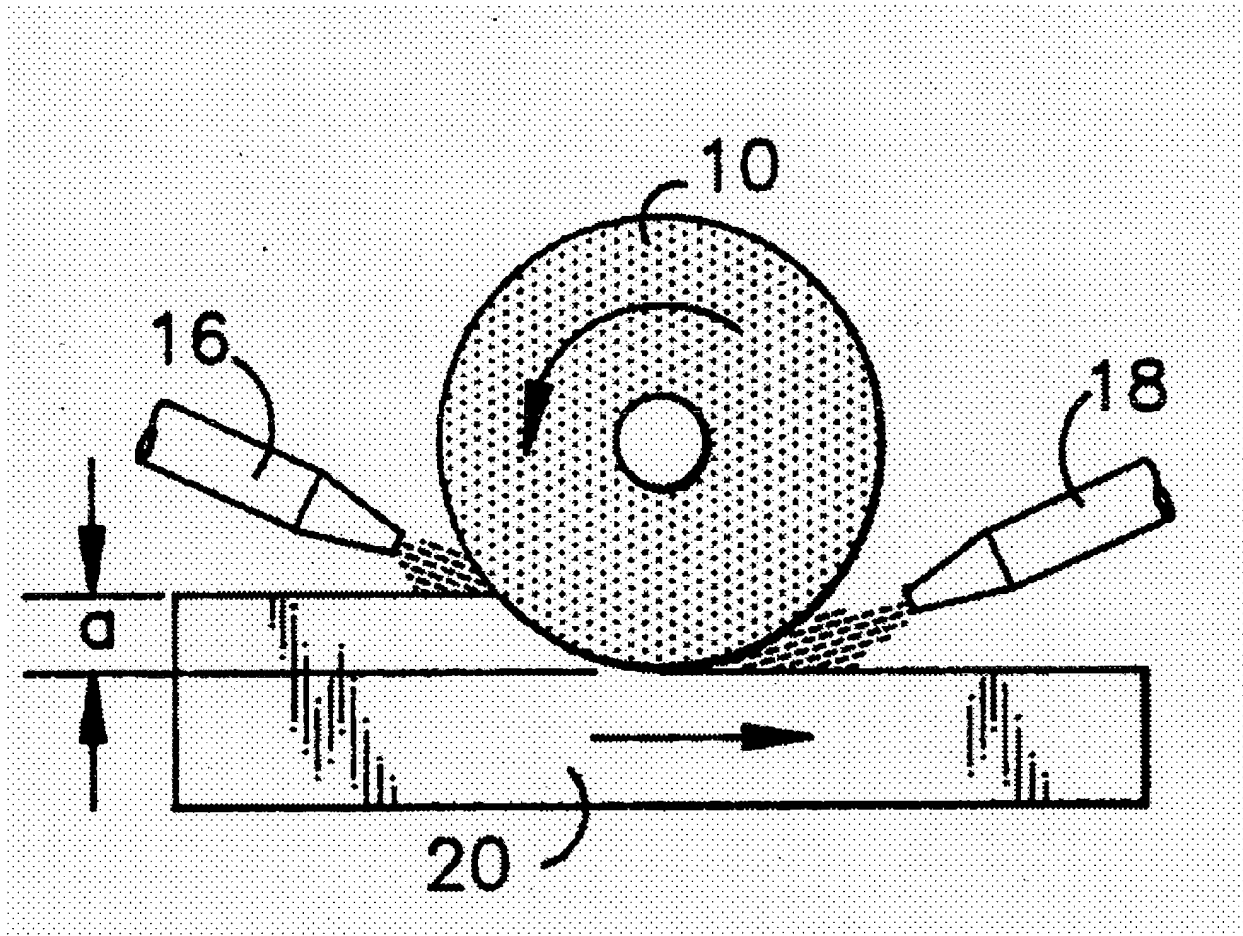


45 The convoluted inner surface of the hollow tube may vary from structures in which simple rounded or pointed projections are directed into the lumen of the tube to more complex structures in which the projections may have interdigitating side branches. The convoluted inner surface of the tube
50 contributes to the resistance to distortion of the tube during use.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Slaughter's nozzle with a convoluted inner surface as taught by Cornelius'265 in order to strengthen the resistance to distortion of the nozzle during use.

Allowable Subject Matter

4. Claims 6-10 are allowed.
5. Claims 3-5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
6. The following is a statement of reasons for the indication of allowable subject matter: the specific limitations of "a first guide surface positioned ... the second coolant stream toward the slot" are not anticipated nor made obvious by the prior art of record in the examiner's opinion. For example, Campbell'5,203,122 discloses an apparatus for supplying coolant to a workpiece comprising: a) a gap for accommodating the workpiece 20; b) at least one coolant inlet; c) a first coolant outlet 16 positioned to direct a first coolant stream toward the workpiece from a first side of the workpiece 20; and d) a second coolant outlet 18 positioned to direct a second coolant stream toward the workpiece from a second side of the workpiece 20.



However, the prior art of record fails to provide or suggest the specific limitations of "a first guide surface positioned ... the second coolant stream toward the slot".

Conclusion

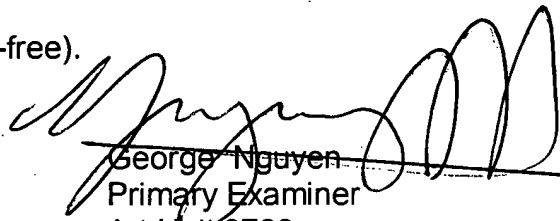
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gravely et al.'6,705,188, Hall'3,273,805, Graves'1,738,646 all disclose coolant supply with dual outlet heads.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Nguyen whose telephone number is 571-272-4491. The examiner can normally be reached on Monday-Friday/630AM-300PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hail can be reached on 571-272-4485. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George Nguyen
Primary Examiner



George Nguyen
Primary Examiner
Art Unit 3723

GN – June 24, 2005